MMWR
Morbidity and Mortality Weekly Report
www.cdc.gov/mmwr

Weekly June 13, 2008 / Vol. 57 / No. 23

Breastfeeding-Related Maternity Practices at Hospitals and Birth Centers — United States, 2007

Breastfeeding provides optimal nutrition for infants and is associated with decreased risk for infant and maternal morbidity and mortality (*1*); however, only four states (Alaska, Montana, Oregon, and Washington) have met all five (*2*) *Healthy People 2010* targets for breastfeeding (*3*).* Maternity practices in hospitals and birth centers throughout the intrapartum period, such as ensuring mother-newborn skin-to-skin contact, keeping mother and newborn together, and not giving supplemental feedings to breastfed newborns unless medically indicated, can influence breastfeeding behaviors during a period critical to successful establishment of lactation (*4–9*). In 2007, to characterize maternity practices related to breastfeeding, CDC conducted the first national Maternity Practices in Infant Nutrition and Care (mPINC) Survey. This report summarizes results of that survey, which indicated that 1) a substantial proportion of facilities used maternity practices that are not evidence-based and are known to interfere with breastfeeding and 2) states in the southern United States generally had lower mPINC scores, including certain states previously determined to have the lowest 6-month breastfeeding rates.† These results highlight the need for U.S. hospitals and birth centers to implement changes in maternity practices that support breastfeeding.

In 2007, in collaboration with Battelle Centers for Public Health Research and Evaluation, CDC conducted the mPINC survey to characterize intrapartum practices in hospitals and birth centers in all states, the District of Columbia, and three U.S. territories. The survey was mailed to 3,143 hospitals and 138 birth centers with registered maternity beds, with the request that the survey be completed by the person most knowledgeable of the facility's infant feeding and maternity practices.

Questions regarding maternity practices were grouped into seven categories that served as subscales in the analyses: 1) labor and delivery, 2) breastfeeding assistance, 3) mother-newborn contact, 4) newborn feeding practices, 5) breastfeeding support after discharge, 6) nurse/birth attendant breastfeeding training and education, and 7) structural and organizational factors related to breastfeeding.§ The subscales were derived

* Breastfeeding objectives are increases in the proportions of mothers who breastfeed their babies to meet the following targets: 75% in the early postpartum period (16-19a), 50% at 6 months (16-19b), 25% at 1 year (16-19c), 40% who exclusively breastfeed for 3 months (16-19d), and 17% who exclusively breastfeed for 6 months (16-19e). Objectives 16-19d and 16-19e were revised since the midcourse review. Additional information is available at ftp://ftp.cdc.gov/pub/health_statistics/nchs/datasets/data2010/focusarea16/o1619d.pdf and ftp://ftp.cdc.gov/pub/health_statistics/nchs/datasets/data2010/focusarea16/o1619e.pdf.

† Available at http://www.cdc.gov/breastfeeding/data/nis_data/data_2004.htm.

§ *Labor and delivery* = mother-newborn skin-to-skin contact and early breastfeeding initiation. *Breastfeeding assistance* = assessment, recording, and instruction provided on infant feeding; not giving pacifiers to breastfed newborns. *Mother-newborn contact* = avoidance of separation during postpartum facility stay. *Newborn feeding practices* = what and how breastfed infants are fed during facility stay. *Breastfeeding support after discharge* = types of support provided after mothers and babies are discharged. *Nurse/birth attendant breastfeeding training and education* = quantity of training and education that nurses and birth attendants receive. *Structural and organizational factors related to breastfeeding* = 1) facility breastfeeding policies and how they are communicated to staff, 2) support for breastfeeding employees, 3) facility not receiving free infant formula, 4) prenatal breastfeeding education, and 5) coordination of lactation care.

INSIDE

The *MMWR* series of publications is published by the Coordinating Center for Health Information and Service, Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services, Atlanta, GA 30333.

Suggested Citation: Centers for Disease Control and Prevention. [Article title]. MMWR 2008;57:[inclusive page numbers].

from literature reviews and consultation with breastfeeding experts. Researchers assigned scores to facility responses on a 0–100 scale, with 100 representing a practice most favorable toward breastfeeding.[¶] Mean scores were calculated for each subscale, generally excluding questions that were unanswered or answered "not sure" or "not applicable." Mean subscale and mean total scores for each state were calculated as an average of scores from all facilities in the state; mean total scores were rounded to the nearest whole number. U.S. scores were calculated as the mean scores for all participating facilities. A subscale score was not calculated if more than half the response data were missing, and mean total scores were not calculated if more than half the subscale scores were missing.

Responses were received from 2,690 (82%) facilities; however, data from three respondent facilities in Guam and the U.S. Virgin Islands were excluded from this analysis because of disclosure concerns, resulting in a sample size of 2,687 facilities (2,546 hospitals and 121 birth centers) in the 50 states, the District of Columbia, and Puerto Rico.[**] The response rate among birth centers (88%) was higher than among hospitals (82%).

Among states, mean total scores ranged from 48 in Arkansas to 81 in New Hampshire and Vermont (Table 1), and regional variation was evident (Figure). Mean total scores generally were higher in the western and northeastern regions of the United States and lower in the southern region. Mean total scores among facilities did not differ by annual number of births, but were higher among birth centers (86 out of 100), compared with hospitals (62) (Table 2).

Among the seven subscales, the highest mean score (80) was for breastfeeding assistance (i.e., assessment, recording, and instruction provided on infant feeding). Within this subscale, 99% of facilities had documented the feeding decisions of the majority of mothers in facility records, and 88% of facilities had taught the majority of mothers techniques related to breastfeeding. However, 65% of facilities advised women to limit the duration of suckling at each breastfeeding, and 45% reported giving pacifiers to more than half of all healthy, full-term breastfed infants, practices that are not supportive of breastfeeding (*7*).

The lowest score (40) was for breastfeeding support after discharge. For this subscale, 70% of facilities reported providing discharge packs containing infant formula samples to breastfeeding mothers, a practice not supportive of breastfeeding (*8*). Although 95% of facilities reported provid-

[¶] Additional information regarding survey questions and scoring is available at http://www.cdc.gov/mpinc.

[**] In describing the results of this study, the District of Columbia and Puerto Rico are referred to as states.

TABLE 1. Mean total and subscale maternity practice scores, by state — Maternity Practices in Infant Nutrition and Care Survey, United States, 2007

State[†]	No. of respondent facilities[§]	% responding	Mean total score[¶]	Standard error of the mean total score	Mean subscale scores*						
					Labor and delivery	Breast-feeding assistance	Mother-newborn contact	Newborn feeding practices	Breast-feeding support after discharge	Nurse/birth attendant breastfeeding training and education	Structural and organizational factors related to breastfeeding
United States	**2,687**	**82**	**63**	**0.3**	**60**	**80**	**70**	**77**	**40**	**51**	**66**
Alabama	47	87	55	1.9	45	71	55	69	27	53	63
Alaska	24	100	73	3.1	79	81	90	86	69	34	60
Arizona	36	71	62	1.9	58	80	75	76	34	52	62
Arkansas	27	60	48	2.3	43	67	57	62	24	29	53
California	201	80	69	1.1	63	82	77	77	49	61	70
Colorado	42	86	66	1.9	65	80	77	84	33	53	70
Connecticut	23	77	70	2.1	73	84	72	92	31	66	74
Delaware	7	100	63	7.0	47	81	77	86	34	39	72
District of Columbia	4	57	76	8.5	89	90	73	80	53	71	80
Florida	95	75	68	1.5	64	84	76	79	44	56	70
Georgia	70	81	56	1.3	48	75	64	71	25	50	63
Hawaii	9	75	62	1.4	79	76	83	80	14	38	60
Idaho	26	81	65	3.0	68	83	80	78	35	46	69
Illinois	109	59	60	1.2	48	78	64	74	35	54	67
Indiana	84	88	62	1.4	60	81	69	77	31	49	66
Iowa	74	91	61	1.2	50	78	66	76	44	44	64
Kansas	68	90	59	1.6	57	74	75	78	35	38	54
Kentucky	43	78	57	1.9	52	76	59	69	28	53	63
Louisiana	45	82	54	2.0	44	75	51	59	33	54	61
Maine	30	91	77	2.3	78	89	79	85	69	66	78
Maryland	29	81	61	2.3	55	79	69	77	26	48	69
Massachusetts	36	77	75	1.5	72	86	72	87	61	72	79
Michigan	76	79	64	1.6	63	81	74	79	33	47	68
Minnesota	85	84	65	1.4	62	82	71	76	54	41	65
Mississippi	38	84	50	2.1	42	69	48	63	28	43	55
Missouri	58	81	63	1.4	61	79	70	79	32	55	66
Montana	30	88	63	3.0	65	77	74	75	41	46	59
Nebraska	48	80	57	1.9	60	74	74	73	32	30	53
Nevada	13	65	57	4.4	52	75	69	74	29	42	59
New Hampshire	23	92	81	1.7	82	90	85	89	72	63	83
New Jersey	46	77	60	1.5	47	82	57	72	25	62	72
New Mexico	20	67	64	3.9	54	81	76	76	48	49	60
New York	110	75	67	1.1	61	84	66	77	48	57	76
North Carolina	71	84	61	1.4	54	81	66	76	31	53	68
North Dakota	17	94	59	3.2	59	80	64	72	31	47	62
Ohio	103	89	67	1.1	59	83	68	80	48	55	75
Oklahoma	49	82	57	1.7	57	74	70	71	21	47	58
Oregon	53	95	74	1.9	76	86	85	88	57	49	71
Pennsylvania	101	87	61	1.3	54	80	62	78	37	50	68
Rhode Island	5	71	77	7.1	64	93	72	86	75	68	85
South Carolina	37	86	57	2.7	47	74	55	66	41	48	62
South Dakota	19	83	61	2.5	56	79	68	78	36	45	67
Tennessee	64	88	57	1.7	53	74	61	73	26	47	62
Texas	190	75	58	1.2	52	73	64	69	35	52	59
Utah	31	79	61	1.8	67	77	66	79	26	48	64
Vermont	11	92	81	2.3	89	95	81	92	72	63	74
Virginia	49	82	61	2.0	53	78	61	79	32	58	67
Washington	65	88	72	1.5	77	86	89	85	53	43	64
West Virginia	27	84	55	2.5	53	76	58	71	25	44	58
Wisconsin	93	90	69	1.3	68	85	71	82	51	51	74
Wyoming	15	83	68	2.7	78	80	76	83	46	48	62
Puerto Rico	11	36	55	3.2	41	74	61	48	42	58	53

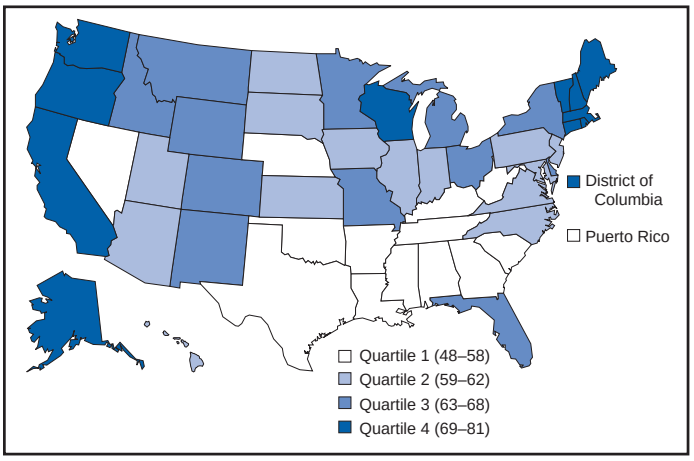
* Maximum possible mean score is 100. Subscale definitions: *Labor and delivery* = mother-newborn skin-to-skin contact and early breastfeeding initiation. *Breastfeeding assistance* = assessment, recording, and instruction provided on infant feeding; not giving pacifiers to breastfed newborns. *Mother-newborn contact* = avoidance of separation during postpartum facility stay. *Newborn feeding practices* = what and how breastfed infants are fed during facility stay. *Breastfeeding support after discharge* = types of support provided after mothers and babies are discharged. *Nurse/birth attendant breastfeeding training and education* = quantity of training and education that nurses and birth attendants receive. *Structural and organizational factors related to breastfeeding* = 1) facility breastfeeding policies and how they are communicated to staff, 2) support for breastfeeding employees, 3) facility not receiving free infant formula, 4) prenatal breastfeeding education, and 5) coordination of lactation care. Additional information regarding survey questions and scoring is available at http://www.cdc.gov/mpinc.

† In describing the results of this study, the District of Columbia and Puerto Rico are referred to as states.

§ Hospitals and birth centers.

¶ The rounded mean of the subscale scores.

FIGURE. Mean total maternity practice scores,* by quartile — Maternity Practices in Infant Nutrition and Care Survey, United States, 2007



* Maximum possible mean score is 100. Additional information regarding survey questions and scoring is available at http://www.cdc.gov/mpinc.

ing a telephone number for mothers to call for breastfeeding consultation after leaving the birth facility, 56% of facilities reported initiating follow-up calls to mothers. Facility-based postpartum follow-up visits were offered by 42% of facilities, and postpartum home visits were reported by 22% of facilities.

For newborn feeding, 24% of facilities reported giving supplements (and not breast milk exclusively) as a general practice with more than half of all healthy, full-term breastfeeding newborns, a practice that is not supportive of breastfeeding (*7,10*). When asked whether healthy, full-term breastfed infants who receive supplements are given glucose water or water, 30% of facilities reported giving feedings of glucose water and 15% reported giving water, practices that are not supportive of breastfeeding. In addition, 17% of facilities reported they gave something other than breast milk as a first feeding to more than half the healthy, full-term, breastfeeding newborns born in uncomplicated cesarean births.

Reported by: *AM DiGirolamo, PhD, Rollins School of Public Health, Emory Univ, Atlanta, Georgia. DL Manninen, PhD, JH Cohen, PhD, Battelle Centers for Public Health Research and Evaluation, Seattle, Washington. KR Shealy, MPH, PE Murphy, MLIS, CA MacGowan, MPH, AJ Sharma, PhD, KS Scanlon, PhD, LM Grummer-Strawn, PhD, Div of Nutrition, Physical Activity, and Obesity, National Center for Chronic Disease Prevention and Health Promotion; DL Dee, PhD, EIS Officer, CDC.*

Editorial Note: This report summarizes results from 2,687 hospitals and birth centers in the first survey of breastfeeding-related maternity practices conducted in the United States. These results provide information regarding maternity practices and policies in birthing facilities and can serve as a baseline with which to compare future survey findings. Individual facilities and states can use this information to improve

TABLE 2. Mean total maternity practice scores,* by annual number of births and facility type — Maternity Practices in Infant Nutrition and Care Survey, United States, 2007

Characteristic	No. of facilities	Mean total score	Standard error
Annual number of births			
0–249	626	63	0.7
250–499	448	60	0.7
500–999	548	62	0.6
1,000–1,999	553	64	0.6
2,000–4,999	440	66	0.6
≥5,000	71	63	1.5
Facility type			
Birth center	121†	86	0.9
Hospital	2,546†	62	0.3

* Maximum possible mean score is 100. Additional information regarding survey questions and scoring is available at http://www.cdc.gov/mpinc.
† One birth center and 22 hospitals had missing data that prevented calculation of at least four subscales; therefore, a mean total score could not be calculated.

maternity practices known to influence breastfeeding in the early postpartum period and after discharge.

The findings indicate substantial prevalences of maternity practices that are not evidence-based and are known to interfere with breastfeeding. For example, 24% of birth facilities reported supplementing more than half of healthy, full-term, breastfed newborns with something other than breast milk during the postpartum stay, a practice shown to be unnecessary and detrimental to breastfeeding (*7,10*). In addition, 70% of facilities reported giving breastfeeding mothers gift bags containing infant formula samples. Facilities should consider discontinuing these practices to provide more positive influences on both breastfeeding initiation and duration (*5,6,8*).

The findings demonstrate that birth centers had higher mean total scores, compared with hospitals. Facility size (based on annual number of births) was not related to differences in scores. Further research is needed to better understand the difference in scores for birth centers and hospitals. Previous research has indicated that the more breastfeeding-supportive maternity practices that are in place, the stronger the positive effect on breastfeeding (*5,6,9*). Comparison of the findings of this report with state breastfeeding rates also suggests a correlation between maternity practice scores and prevalence of breastfeeding. For example, in the 2006 National Immunization Survey, seven states (Alabama, Arkansas, Kentucky, Louisiana, Mississippi, Oklahoma, and West Virginia) had the lowest percentages (<30%) of children breastfed for 6 months. The same seven states were among those with the lowest mean total maternity practice scores (48–58) in mPINC.

The findings in this report are subject to at least one limitation. Data were reported by one person at each facility and might not be representative of actual maternity practices in use. However, CDC sought to prevent inaccuracies by request-

ing that the survey be completed by the person most knowledgeable about the facility's maternity practices, in consultation with other knowledgeable persons when necessary. The survey was pretested with key informants in nine facilities across the country, with follow-up visits to each facility to validate responses. Information from the key informants generally was found to be accurate. Further validation through patient interviews or medical chart reviews has not been conducted.

In July 2008, mPINC benchmark reports will be provided to each facility that completed a survey, comparing the facility's subscale and total scores with the scores of all other participating facilities, other facilities in the state, and facilities of a similar size nationally. These reports also will provide the facility score for each item comprising the subscales, which can help facilities identify specific maternity practices that might be changed to better support breastfeeding. Aggregate data will be shared with state health departments to facilitate their work with birth facilities to improve breastfeeding care. CDC plans to repeat the mPINC survey periodically to assess changes over time.

The American Academy of Family Physicians,[††] American Academy of Pediatrics,[§§] and Academy of Breastfeeding Medicine[¶¶] all recommend that physicians provide intrapartum care that is supportive of breastfeeding. Hospitals and birth centers provide care to nearly all women giving birth in the United States. Thus, improving maternity practices in these facilities affords an opportunity to support establishment and continuation of breastfeeding. Establishing these practices as standards of care in birth facilities throughout the United States can improve progress toward meeting the *Healthy People 2010* breastfeeding objectives and improve maternal and child health nationwide.

Acknowledgments

This report is based, in part, on contributions by E Adams, PhD, Oregon Health & Science Univ, Portland, Oregon; K Rosenberg, MD, Oregon Dept of Human Svcs; A Grinblat, MD, State Univ of New York at Buffalo; CL Quinn, MD, Albert Einstein College of Medicine, Bronx, New York; M Applegate, MD, New York State Dept of Health; K Cadwell, PhD, C Turner-Maffei, MA, Baby-Friendly USA, East Sandwich, Massachusetts; A Crivelli-Kovach, PhD, Arcadia Univ; E Declercq, PhD, Boston Univ School of Public Health; A Merewood, MPH, B Philipp, MD, Boston Medical Center, Massachusetts; J Dellaport, RD, L Tiffin, MS, California Dept of Health Svcs; MK Dugan, MA, E Miles, MPH, Battelle Centers for Public Health Research and Evaluation, Seattle, Washington; M Pessl, Evergreen Perinatal Education, Bellevue, Washington; L Feldman-Winter, MD, Univ of Medicine and Dentistry of New Jersey, Newark, New Jersey; and A Spangler, MN, Amy's Babies, Atlanta, Georgia.

[††] Available at http://www.aafp.org/online/en/home/policy/policies/h/hospuseinfantformulabreastfeeding.html.

[§§] Available at http://aappolicy.aappublications.org/cgi/reprint/pediatrics;115/2/496.pdf.

[¶¶] Available at http://www.bfmed.org/ace-files/protocol/mhpolicy_abm.pdf.

References

1. Ip S, Chung M, Raman G, et al. Breastfeeding and maternal and infant health outcomes in developed countries. Rockville, MD: US Department of Health and Human Services, Agency for Healthcare Research and Quality; 2007. Available at http://www.ahrq.gov/downloads/pub/evidence/pdf/brfout/brfout.pdf.
2. CDC. Breastfeeding trends and updated national health objectives for exclusive breastfeeding—United States, birth years 2000–2004. MMWR 2007;56:760–3.
3. US Department of Health and Human Services. Healthy people 2010 midcourse review. Washington, DC: US Department of Health and Human Services; 2005. Available at http://www.healthypeople.gov/data/midcourse.
4. United Nations Childrens Fund/World Health Organization. Promoting, protecting, and supporting breastfeeding: the special role of maternity services. Geneva, Switzerland: United Nations Childrens Fund/World Health Organization; 1989.
5. DiGirolamo AM, Grummer-Strawn LM, Fein S. Maternity care practices: implications for breastfeeding. Birth 2001;28:94–100.
6. Murray EK, Ricketts S, Dellaport J. Hospital practices that increase breastfeeding duration: results from a population-based study. Birth 2007;34:202–11.
7. Dewey KG, Nommsen-Rivers LA, Heinig MJ, Cohen RJ. Risk factors for suboptimal infant feeding behavior, delayed onset of lactation, and excess neonatal weight loss. Pediatrics 2003;112:607–19.
8. Rosenberg KD, Eastham CA, Kasehagen LJ, Sandoval AP. Marketing infant formula through hospitals: the impact of commercial hospital discharge packs on breastfeeding. Am J Public Health 2008;98:290–5.
9. Chien LY, Tai CJ, Chu KH, Ko YL, Chiu YC. The number of baby friendly hospital practices experienced by mothers is positively associated with breastfeeding: a questionnaire survey. Int J Nurs Stud 2007;44:1138–46.
10. Swenne I, Ewald U, Gustafsson J, Sandberg E, Ostenson CG. Interrelationship between serum concentrations of glucose, glucagon, and insulin during the first two days of life in healthy newborns. Acta Paediatr 1994;83:915–9.

Escherichia coli 0157:H7 Infections in Children Associated with Raw Milk and Raw Colostrum From Cows — California, 2006

On September 18, 2006, the California Department of Public Health (CDPH) was notified of two children hospitalized with hemolytic uremic syndrome (HUS). One of the patients had culture-confirmed *Escherichia coli* O157:H7 infection, and both patients had consumed raw (unpasteurized) cow milk in the week before illness onset. Four additional cases of *E. coli* O157:H7 infection in children who had consumed raw cow milk or raw cow colostrum produced by the same dairy were identified during the following 3 weeks.